

What is claimed is:

1. A method for processing a substrate, comprising:  
seasoning a chamber by exposing the inside of the chamber to a first mixture comprising one or more organosilicon compounds and one or more oxidizing gases in the presence of RF power to deposit a seasoning layer on one or more interior surfaces of the chamber; and  
depositing a low dielectric constant layer on a substrate in the chamber by reacting a second mixture comprising one or more organosilicon compounds and one or more oxidizing gases in the presence of RF power, wherein a ratio of a total flow rate of the one or more organosilicon compounds of the first mixture into the chamber to a total flow rate of the one or more oxidizing gases of the first mixture into the chamber is lower than a ratio of a total flow rate of the one or more organosilicon compounds of the second mixture into the chamber to a total flow rate of the one or more oxidizing gases of the second mixture into the chamber.
2. The method of claim 1, wherein the one or more oxidizing gases of the first mixture and the one or more oxidizing gases of the second mixture are selected from the group consisting of oxygen, ozone, nitrous oxide, carbon monoxide, carbon dioxide, 2,3-butane dione, or combinations thereof.
3. The method of claim 1, wherein the one or more organosilicon compounds of the first mixture and the one or more organosilicon compounds of the second mixture are the same.
4. The method of claim 1, wherein the one or more organosilicon compounds of the first mixture and the one or more organosilicon compounds of the second mixture are different.
5. The method of claim 1, wherein the ratio of a total flow rate of the one or more organosilicon compounds of the first mixture into the chamber to a total flow

rate of the one or more oxidizing gases of the first mixture into the chamber is between about 1:2 and about 1:4.

6. The method of claim 1, wherein the one or more organosilicon compounds of the first mixture and the one or more organosilicon compounds of the second mixture consist of trimethylsilane, and the one or more oxidizing gases of the first mixture and the one or more oxidizing gases of the second mixture consist of oxygen.

7. The method of claim 1, wherein the seasoning layer has a refractive index of between about 1.43 and about 1.46.

8. The method of claim 1, wherein the seasoning layer has compressive stress.

9. A method for processing a substrate, comprising:

seasoning a chamber by exposing the inside of the chamber to a first mixture comprising one or more organosilicon compounds and one or more oxidizing gases in the presence of RF power to deposit a seasoning layer comprising about 5 atomic % or less carbon on one or more interior surfaces of the chamber; and

depositing a low dielectric constant layer comprising greater than about 5 atomic % carbon on a substrate in the chamber by reacting a second mixture comprising one or more organosilicon compounds and one or more oxidizing gases in the presence of RF power.

10. The method of claim 9, wherein the one or more oxidizing gases of the first mixture and the one or more oxidizing gases of the second mixture are selected from the group consisting of oxygen, ozone, nitrous oxide, carbon monoxide, carbon dioxide, 2,3-butane dione, or combinations thereof.

11. The method of claim 9, wherein a ratio of a total flow rate of the one or more organosilicon compounds of the first mixture into the chamber to a total flow rate of

PATENT

Attorney Docket No.: AMAT/8696/DSM/LOW K/JW

Express Mail No.: EV335471269US

the one or more oxidizing gases of the first mixture into the chamber is lower than a ratio of a total flow rate of the one or more organosilicon compounds of the second mixture into the chamber to a total flow rate of the one or more oxidizing gases of the second mixture into the chamber.

12. The method of claim 9, wherein the ratio of a total flow rate of the one or more organosilicon compounds of the first mixture into the chamber to a total flow rate of the one or more oxidizing gases of the first mixture into the chamber is between about 1:2 and about 1:4.

13. The method of claim 9, wherein the seasoning layer has compressive stress.

14. The method of claim 9, wherein the one or more organosilicon compounds of the first mixture and the one or more organosilicon compounds of the second mixture consist of trimethylsilane, and the one or more oxidizing gases of the first mixture and the one or more oxidizing gases of the second mixture consist of oxygen.

15. A computer storage medium containing a software routine that, when executed, causes a general purpose computer to control a deposition chamber to perform a method for processing a substrate, comprising:

seasoning a chamber by exposing the inside of the chamber to a first mixture comprising one or more organosilicon compounds and one or more oxidizing gases in the presence of RF power to deposit a seasoning layer on one or more interior surfaces of the chamber; and

depositing a low dielectric constant layer on a substrate in the chamber by reacting a second mixture comprising one or more organosilicon compounds and one or more oxidizing gases in the presence of RF power, wherein a ratio of a total flow rate of the one or more organosilicon compounds of the first mixture into the chamber to a total flow rate of the one or more oxidizing gases of the first mixture into the chamber is lower than a ratio of a total flow rate of the one or more

PATENT

Attorney Docket No.: AMAT/8696/DSM/LOW K/JW

Express Mail No.: EV335471269US

organosilicon compounds of the second mixture into the chamber to a total flow rate of the one or more oxidizing gases of the second mixture into the chamber.

16. The computer storage medium of claim 15, wherein the one or more organosilicon compounds of the first mixture and the one or more organosilicon compounds of the second mixture are the same.

17. The computer storage medium of claim 15, wherein the one or more organosilicon compounds of the first mixture and the one or more organosilicon compounds of the second mixture are different.

18. The computer storage medium of claim 15, wherein the ratio of a total flow rate of the one or more organosilicon compounds of the first mixture into the chamber to a total flow rate of the one or more oxidizing gases of the first mixture into the chamber is between about 1:2 and about 1:4.

19. The computer storage medium of claim 15, wherein the seasoning layer has compressive stress.

20. The computer storage medium of claim 15, wherein the one or more organosilicon compounds of the first mixture and the one or more organosilicon compounds of the second mixture consist of trimethylsilane, and the one or more oxidizing gases of the first mixture and the one or more oxidizing gases of the second mixture consist of oxygen.